Claims 14-28, 30 and 31 have been previously rejected under 35 U.S.C. §103(a) as being unpatentable over the combination of applicant's admitted prior art, *Endo et al.* (US Patent No. 4,532,150), European Patent 0725440, *Wang et al.* (US Patent No. 4872947), *Somekh* (US Patent No. 6,291,334), and *Zhao* (US Patent No. 6,071,809). The Examiner asserted that it would have been obvious to one of ordinary skill in the art at the time the invention was made to employ the silicon carbide deposition process of *Endo et al.* or European Patent 0725440 as the dielectric or barrier layers in the Applicants' prior art structure, form the silicon carbide layers *in situ* with other materials in view of the deposition processes in the disclosure of *Wang et al.,* and with the etch stops of *Somekh* and *Zhao* to enable the formation of the structure of Figure 1. Applicant respectfully respond to this rejection.

Applicant respectfully submits this preliminary amendment and discussion accompanying a Continued Prosecution Application filed Herewith. Applicant respectfully submit that *Somekh* (US Patent No. 6,291,334) and the pending application 09/270,039 are commonly owned by Applied Materials, Inc. Thus, *Somekh* is not prior art as asserted by the Examiner under U.S.C. §103(c). A statement of common ownership is submitted herewith.

Applicant discloses knowledge of the use of anti-reflective coatings (ARC) and photoresist materials in photolithographic processes for patterning a feature shape on a substrate surface and then etching the feature shape to form a feature definition. Applicants disclose knowledge that prior art anti-reflective coatings (ARC) have had high dielectric constants.

Endo et al. '150 discloses a process for depositing silicon carbide on a substrate. The substrate may be metallic, such as aluminum material. Europe '440 discloses depositing a silicon carbon barrier layer on a metal surface, between two metal layers to prevent interlayer diffusion, or between a metal and a subsequently deposited dielectric material to prevent diffusion of the metal into the dielectric material and insulate layers of wiring.

Wang et al. discloses a thermal CVD deposition of silicon oxide followed by a plasma enhanced CVD deposition of silicon oxide in the same processing chamber.

Somekh discloses depositing a carbon based etch stop, such as a diamond like

amorphous carbon and fluorocarbon, or alternatively, silicon carbide, having a low dielectric constant in a method for forming a dual damascene structure. *Zhao* discloses depositing a etch stop over a low k dielectric layer, and the dielectric layer may comprise a variety of dielectric materials including silicon carbide.

Endo et al. provides no disclosure or suggestion of silicon carbide as a barrier layer, etch stop, or ARC, or depositing a silicon carbide layer with a low dielectric constant. *Endo et al.* further provides no disclosure or suggestion of depositing a first dielectric layer *in situ* on a silicon carbide layer or depositing a photoresist layer, wherein the first dielectric layer comprises a silicon-oxygen-carbon based material. Applicants also disclose that *Endo et al.* provides no disclosure of SiC as a barrier layer, etch stop, or ARC.

European Patent 0725440 does not disclose silicon carbide as an etch stop or anti-reflective coating as recited in one or more of the rejected claims. As disclosed in Applicants' specification, European Patent 0725440 (*Loboda* U.S. Pat. No. 5,818,071), is designed to accommodate a subtractive deposition in which the substrate deposition deposits the metal layer, then etches the metal and deposits the SiC into the etched metal layer. Therefore, routine optimization of the silicon carbide barrier layer of European Patent 0725440 in view of the other references as asserted by the Examiner would not suggest or motivate depositing a silicon carbide etch stop or a silicon carbide anti-reflective coating as recited in one or more of the rejected claims. European Patent 0725440 further provides no disclosure or suggestion of depositing a first dielectric layer *in situ* on a silicon carbide layer or depositing a photoresist layer, wherein the first dielectric layer comprises a silicon-oxygen-carbon based material.

Further, *Wang et al.*, Applicant's disclosure of knowledge, *Somekh* and *Zhao*, either alone or in combination with any other references, does not teach, show, or suggest depositing silicon carbide materials, either *in situ*, or with other dielectric materials, wherein the dielectric layer comprises a silicon-oxygen-carbon based material. Additionally, *Wang et al.* and Applicants disclosure of knowledge, either alone or in combination with any other references, does not teach, show, or suggest depositing silicon carbide materials as barrier layers, etch stops, or as ARC films.

Endo et al., European Patent 0725440, *Wang et al.*, *Somekh* and *Zhao*, and Applicants disclosure of knowledge, either alone or in combination, do not teach, show or suggest depositing a silicon carbide layer, depositing a first dielectric layer *in situ* on the silicon carbide layer, wherein the first dielectric layer comprises a silicon-oxygen-carbon based material, and then depositing a photoresist layer, as recited in claim 14 and claims dependent thereon.

Endo et al., European Patent 0725440, *Wang et al.*, *Somekh* and *Zhao*, and Applicants disclosure of knowledge, either alone or in combination, do not teach, show or suggest depositing a silicon carbide barrier layer on the substrate, depositing a first dielectric layer *in situ* on the barrier layer, wherein the first dielectric layer comprises a silicon-oxygen-carbon based material, depositing an etch stop *in situ* on the first dielectric layer, depositing a second dielectric layer *in situ* on the etch stop, depositing a silicon carbide anti-reflective coating *in situ* on the second dielectric layer and depositing a photoresist layer on the silicon carbide anti-reflective coating, as recited in claim 26, and claims dependent thereon.

Therefore, *Endo et al.*, European Patent 0725440, *Wang et al.*, and Applicants disclosure of knowledge, either alone or in combination, do not teach, show or suggest claimed aspects of the invention. Withdrawal of the rejection is respectfully requested.

Claim 29 is rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of *Endo et al.* '150, Europe '440, *Wang et al. '947, Somekh* and *Zhao* as applied to claims 14-28, 30 and 31 above, and further in view of *Subrahmanyan et al.* The Examiner asserts that it would have been within the scope of one of ordinary skill in the art to combine the teachings of *Endo et al.* '150, Europe '440, *Wang et al. '947, Somekh* and *Zhao* and *Subrahmanyan et al.* to achieve reduction of contact resistance by including a nitrogen/hydrogen plasma cleaning.

Endo et al. '150, Europe '440, *Wang et al. '947, Somekh* and *Zhao* are described above. *Subrahmanyan et al.* discloses a precleaning process for cleaning dielectric materials by a plasma of reactive gas such as oxygen, a mixture of CF_4/O_2, or a mixture of He/NF_3, with the plasma generated by a remote plasma source.

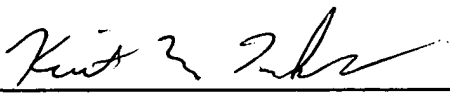
Subrahmanyan et al., either alone or in combination with *Endo et al.* '150, Europe '440, *Wang et al. '947, Somekh* and *Zhao*, does not teach, show or suggest depositing

a silicon carbide barrier layer on the substrate, depositing a first dielectric layer *in situ* on the barrier layer, wherein the first dielectric layer comprises a silicon-oxygen-carbon based material, depositing an etch stop *in situ* on the first dielectric layer, depositing a second dielectric layer *in situ* on the etch stop, depositing a silicon carbide anti-reflective coating *in situ* on the second dielectric layer and depositing a photoresist layer on the silicon carbide anti-reflective coating, as recited in claim 26, and claims dependent thereon. Withdrawal of the rejection is respectfully requested.

The prior art made of record is noted. However, it is believed that the secondary references are no more pertinent to the Applicants' disclosure than the primary references cited in the office action. Therefore, it is believed that a detailed discussion of the secondary references is not deemed necessary for a full and complete response to the prior office action.

In conclusion, the references cited by the Examiner, neither alone nor in combination, teach, show, or suggest the claimed aspects of the invention. Having addressed all issues set out in the prior office action, Applicants respectfully submit that the claims are in condition for allowance and respectfully request that the claims be allowed.

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW CHANGES

14. (Thrice Amended) A method of forming a silicon carbide layer on a substrate, comprising:

introducing silicon, carbon, and a noble gas into a chamber;

initiating a plasma in the chamber;

reacting the silicon and the carbon in the presence of the plasma to deposit a silicon carbide layer having a dielectric constant less than 7.0 on the substrate in the chamber;

depositing a first dielectric layer *in situ* on the silicon carbide layer, wherein the first dielectric layer comprises a silicon-oxygen-carbon based material; and then

depositing a photoresist layer.

26. (Twice Amended) A method of *in situ* deposition of silicon carbide on a substrate, comprising:

depositing a silicon carbide barrier layer on the substrate;

depositing a first dielectric layer *in situ* on the barrier layer, wherein the first dielectric layer comprises a silicon-oxygen-carbon based material;

depositing an etch stop *in situ* on the first dielectric layer;

depositing a second dielectric layer *in situ* on the etch stop;

depositing a silicon carbide anti-reflective coating *in situ* on the second dielectric layer; and

depositing a photoresist layer on the silicon carbide anti-reflective coating.

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